Oil Price Shocks: A Comparative Study on the Impacts in Purchasing Power in Pakistan

Muhammad Bachal Jamali
Associate Professor, Deptt of Commerce
Shah Abdul Latif University-Khairpur

Asif Shah
Assistant Professor, Deptt of Commerce
Shah Abdul Latif University-Khairpur

Hassan Jawad Soomro
Assistant Professor
Department of Commerce, SALU-Khairpur
E-mail: hassanjawadsoomro@yahoo.com

Kamran Shafiq
COMSATS-Abbott bad
E-mail: kamranhashmi@ciit.net.pk

Faiz M.Shaikh
Assistant Professor
SZABAC-Dokri, Sindh-Pakistan
Email: faizanmy2000@hotmail.com

Received: November 23, 2010 Accepted: February 28, 2011 doi:10.5539/mas.v5n2p192

Abstract

The current research investigates the relationship between changes in crude oil prices and Pakistan and the macro-economy. A multivariate VAR analysis is carried out among five key macroeconomic variables: real gross domestic product, short term interest rate, real effective exchange rates, long term interest rate and money supply. From the VAR model, the impulse response functions reveal that oil price movements cause significant reduction in aggregate output and increase real exchange rate. The variance decomposition shows that crude oil prices significantly contribute to the variability of real exchange rate long term interest rate in the Pakistan economy while oil price shocks are found to have significant effects on money supply and short term interest rate in the economy. Despite these macro econometric results, caution must be exercised in formulating energy policies since future effects of upcomming oil shocks will not be the same as what happened in the past. Explorations and development of practicable alternatives to imported fuel energy will cushion the economy from the repercussions of oil shocks. Oil price shock has negative impact on the GDP and as well as economy of Pakistan.

Keywords: Oil price fluctuations, Macroeconomic performance, Pakistan

1. Introduction

The global economy is now facing its worst prospects in more than half a century, with increasing financial losses, falling asset prices, and a deep downturn in real economic activity. Several developed economies including the US, UK, Japan and Germany are already in recession. Overall global GDP growth is projected to decline by the World Bank, from 2.5 per cent in 2008 to 0.9 per cent in 2009, the weakest since records became available in 1970. International trade would decelerate sharply, with global export volumes declining for the first time since 1982. As labor market conditions have deteriorated, consumer spending, business investment, and industrial production have also declined, the Federal Reserve lowered the target for its benchmark interest rate and established a target range for the federal funds rate of 0 per cent and 0.25 per cent. The European Commission in November unveiled an economic recovery plan worth €200bln.with aims to save further job losses, stimulate spending and boost consumer confidence. The ECB has reduced its key policy rate from 4.25 per cent in September to 2 per cent by mid-January. The British central bank has reduced interest rates four times since April from 5.0 per cent to 1.5 per cent. The latest half-percentage point cut in January 2009, that brings the rate to its lowest level in the central bank's 315-year history, was necessitated by weakening consumer spending, a tightening credit market for households and businesses, and a deteriorating business and residential investment outlook. Bank of Japan has cut interest rates from 0.5 per cent to 0.3 and then to 0.1 per cent by mid-December, and has adopted several liquidity enhancing measures. The Bank of Korea lowered its Base Rate from 5.00 per cent in early October to 2.50 per cent by January 2009. China has cut lending rates considerably since mid-September and unveiled a 4 trillion-yuan fiscal stimulus package in early November to rejuvenate the weakening economy. The Bank of Thailand cut the benchmark interest rate by 75 basis points to 2 per cent in January, the decision, which follows a 1-percentage point reduction in December, is more aggressive than expected.

A permanent oil price shock would clearly have a major impact on the world economy. This should send a message to policymakers around the world to consider ways to tackle demand and improve energy efficiency, in order to reduce the vulnerability of their economies to an oil price shock. Oil price shocks would normally affect macroeconomic performance through a number of channels. First, higher oil prices transfer income from oil-importing countries to oil-exporting countries through a shift in the terms of trade. This results in a loss of real income for oil-importing countries. Second, higher oil prices reduce industry output through higher costs of production. Third, they directly increase inflation via higher prices of imported goods and petroleum products. If higher inflation leads to an upward spiral in wages, central banks would be forced to raise interest rates.

Higher oil price causes different impacts to both net oil importers and net oil exporters in this world (combining both crude and products). The effect of the oil shock is expected to lower world GDP because of the reduced purchasing power by the oil importers to balance higher oil import costs will not fully offset by increased demand for imports from oil exporters. Therefore, GDP of most oil importing countries fall as their exports of other goods will fall as well. As a net exporter of oil, oil price shocks will impede the growth of trade between Pakistan and other countries, especially for oil importing countries like U.S., China, Japan and Europe. Economic slowdown in these countries will limit their demand of consumers' and thus affect Pakistan exports of goods and services.

2. Literature Review

Since the first oil shock in 1973/74, much research has been undertaken into the oil price–macro economy nexus. These studies have reached different conclusions over time. Earlier works (Hamilton, 1983; Burbidge and Harrison, 1984) have achieved statistically significant empirical relationships between oil prices and aggregate economic performance, principally GDP/ GNP growth. Hamilton (1983) propounded three hypotheses for oil-shock and output correlation: (1) historical coincidence,(2)endogeneity of crude oil prices, and (3) causal influence of an exogenous increase in the price of crude petroleum. Econometric results showed that there was insignificant evidence that the correlation was neither a consequence of coincidence nor a set of influences that triggered oil shocks and recessions. The causal interpretation leads to the conclusion that the characteristics of the pre-1973 recessions would have been different if such energy shocks and disruptions did not come about (Hamilton 1983).

Meanwhile Burbidge and Harrison (1984) tested the effects of increases in oil 9prices using a seven-variable vector auto regression (VAR) model for five countries (United States, Japan, Germany, United Kingdom and Canada) in the Organization for Economic Cooperation and Development (OECD) using monthly data from January 1961 to June 1982. They found out that substantial effects of oil-price shocks on price level were evident on the U.S. and Canadian economies and with great pressure on industrial production on U.S. and U.K. They also pointed out that the oil shock in 1973 only worsened the incoming recession of that period. Following the collapse of oil prices in 1986, it was argued that the oil price–macro economy relationship has weakened. In addition, an asymmetric oil price–macro economy relationship was established (Mork, 1989). Mork (1989) extended Hamilton's study by using a longer data sample and taking into account oil price controls existed during the 1970s. Furthermore, he looked into the possibility of an asymmetric response to oil price increases as well as decreases. The results showed that GNP growth was correlated with the circumstances of the oil market and that oil price declines were not statistically significant as oil price increases.

Mork, Olsen and Mysen (1994) applied essentially the same model as Mork (1989) to the experience of seven OECD countries over the period 1967:3-1992:4. Their model also included the contemporaneous oil price and five quarterly lags for price increases and decreases separately. For the United States, the contemporaneous price increase and the first and second lags were significant, and of negative sign. Five of the other six countries; Japan, West Germany, France, Canada, and the United Kingdom had roughly similar patterns of coefficients, while Norway had positive, statistically significant elasticities for both price increases and decreases.

When almost all researches dealt with the effects of oil prices, as measured in 10levels or in logarithmic form, on key macroeconomic variables, (Ferderer, 1996) used oil price volatility (monthly standard deviations of daily oil prices) to assess movements in U.S. aggregate output. He also took note of the monetary channel through which oil prices affect the economy by including federal funds rate and non-borrowed reserves to capture the monetary policy stance during oil shocks. Results showed that contractionary monetary policy in reaction to oil price increases partly explains the correlation between oil and output. However, sectoral shocks and uncertainty channels, but not monetary policy channel, provide partial explanation to the asymmetric relationship between oil price changes and output growth (Ferderer, 1996).

3. Theoretical Framework

Volatility of oil prices has negative repercussions on the aggregate economy as abundantly shown by economic literature. An oil price shock, as a classic example of an adverse supply shock, i.e. an increase in oil prices shifts the aggregate supply upward, results to a rise in price level and a reduction in output and employment (Dornbusch, Fisher and Startz 2001). On the other hand, aggregate demand decreases as higher commodity prices translate to lower demand for goods and services, resulting to contraction in aggregate output and employment level. The macroeconomic effects of oil shocks are transmitted via supply and demand side channels and are potentially minimized by economic policy reactions.

3.1 Supply Side Channel

Since oil is a factor of production in most sectors and industries, a rise in oil prices increases the companies' production costs and thus, stimulates contraction in output (Jimenez-Rodriguez and Sanchez 2004). Given a firm's resource constraints, the increase in the prices of oil as an input of production reduces the quantity it can produce. Hunt, Isard and Laxton (2001) add that an increase in input costs can drive down non-oil potential output supplied in the short run given existing capital stock and sticky wages. Moreover, workers and producers will counter the declines in their real wages and profit margins, putting upward pressure on unit labor costs and prices of finished goods and services.

In addition, oil price volatility shrinks investment activities in production of oil and gas (Verleger 1994 as cited from Raguindin & Reyes, 2005). Verleger (1994) as cited from Raguindin & Reyes (2005) adds that a "permanent increase in volatility might lead to a situation where future capacity will always be a little lower than in a world of zero price volatility and prices a little higher". Hamilton (1996) shares the same point and stresses that concerns on oil prices variability and oil supply disruptions could cause postponement of investment decisions in the economy.

3.2 Demand Side Channel

As presented earlier, oil price increases translate to higher production costs, leading to commodity price increases at which firms sell their products in the market. Higher commodity prices then translate to lower demand for goods and services, therefore shrinking aggregate output and employment level. Furthermore, higher oil prices affect aggregate demand and consumption in the economy. The transfer of income and resources from an oil-importing to oil-exporting economies is projected to reduce worldwide demand as demand in the former is likely to decline more than it will rise in the latter (Hunt, Isard and Laxton 2001). The resulting lower purchasing power of the oil-importing economy translates to a lower demand. Also, oil price shocks pose economic uncertainty on future performance of the macro economy. People may postpone consumption and investment decisions until they see an improvement in the economic situation. In sum, an increase in oil prices causes a leftward shift in both the demand and supply curve, resulting to higher prices and lower output.

3.3 Economic Policy Reactions

The effects of oil price increases on headline and core inflation may stimulate the tightening of monetary policy (Hunt, Isard and Laxton 2001). Authorities have the policy tools to minimize, if not totally eliminate, the adverse effects of such shock. The Central Bank (CB) has its key policy interest rates that can influence demand and inflation directions in the economy. However, pursuing 12one policy can be counterproductive; when CB cuts its interest rate, demand rises, but at the expense of higher inflation, and vice versa.

The credibility of the monetary authorities in responding to oil shocks is at stake when monetary policy reactions appeared inconsistent with the announced policy objectives. As a result, inflation expectation and process are disrupted (Hunt, Isard and Laxton 2001). Money supply plays a role on the negative correlation between oil prices and economic activity. By means of the real money balances channel, increases in oil prices cause inflation which, in turn, reduces the quantity of real balances in the economy (Ferderer 1996). Ferderer (1996) further noted that "counter inflationary monetary policy responses to oil price shocks are responsible for the real output losses associated with these shocks".

4. Empirical Method

This section presents the empirical method used in this paper to assess the oil price- macro economy relationship of the Pakistan. First, data definition and limitation are discussed. Second, a vector auto regression (VAR) model was constructed using historical data to capture the behavior of the macro economy given oil price fluctuations. Impulse response functions were examined to trace out the response of the dependent variable in the VAR model to shocks in the error terms. Variance decomposition technique was done to evaluate the relative importance of oil price fluctuations on the volatility of the other variables in the model.

4.1 The Data

This paper used quarterly data for the period 1992:2 to 2006:4 of five macroeconomic variables and oil price variables to capture economic behavior. The model includes output and exchange rate variables (real gross domestic product (RGDP) and real effective exchange rate (REER), three monetary variables namely money supply (M1), long term interest rate (GBOND5) and short term interest rate (TBILLS3) and the oil price variable (ROIL). RGDP, ROIL and REER were expressed in logarithmic form while M1, GBONDS5 and TBILLS3 were expressed in levels. The data sets were obtained from the International Finance Statistics (IFS), Economic Planning Unit (EPU), Statistics Department of Pakistan and the Economic and Social Research Council (ESRC) of the W.

4.2 Definition of Terms

Five of the most commonly used terms in this research are defined as follows:

1. Gross Domestic Product (RGDP) is a measure of total output within the geographic limits of the country, regardless of the nationality of the producers of output.

2. Real Effective Exchange Rate (REER) index of the Ringgit Pakistan 13(RM) and the British Pound Sterling are the Nominal Effective Exchange Rate Index (NEERI) of the RM and Pound adjusted for inflation rate differentials with the countries whose currencies comprise the NEERI basket.

3. Short Term Interest Rate (TBILLS) interest rates on loan contracts-or debt

4. Long Term Interest Rate (GBONDS) is the interest rate earned by a note or bond that matures in 10 or more years.

5. Money supply (M1) is currency plus demand deposits.

4.3 Oil Price Variable

A number of studies used different oil price variables to account for the effects of these shocks on economic activity. Hamilton (1983) used the quarterly changes in nominal Producer's Price Index (PPI) for crude petroleum. Burbidge and Harrison (1984) employed a relative price of oil computed as the ratio of Saudi Arabian crude cost (US$) to the CPI of the country under studied. Mork (1989) used the refiner acquisition cost (RAC) for crude oil and PPI. Ferderer (1996) used the monthly means and standard deviations of prices for refined petroleum products (deflated by CPI) as the real oil price and oil price volatility, respectively. Abeysinghe (2001) proposed different definitions of oil price variables4 and finally modeled the oil price in first-log-difference of oil price (in US$) multiplied by the country's exchange rate. He pointed out that the other real oil price definition appears to be a poor proxy for the relative oil price because of the direct dependence of CPI to oil price. Hooker (1996a) and Jimenez-Rodriguez and Sanchez (2004) both used oil prices in real terms but the former also included nominal PPI for crude petroleum in his regression model.

Most of the international cross-country analysis used the US$ world oil price in real terms (PPI for crude oil divided by PPI for all commodities) or the world oil price transformed into each country's currency through the exchange rate. However, only the latter recognizes the different effects of oil prices on each country due to exchange rate volatility or level of inflation. Furthermore, as noted by Cunado and de Gracia (2004), oil prices converted into each country's currency produced more significant impacts on variables under study.

4.4 The Vector Auto regression (VAR) Model

A number of the studies cited made use of vector auto regression models. This technique treats all variables in the system as endogenous and regresses each current (non-lagged) variable in the model on all the variables in the model lagged a certain number of times.

The study employs the following VAR model of order p (VAR (p)):

$$Yt = c + \Sigma\ AiYt\text{-}1 + \varepsilon t\ ,$$

where Yt is a (n x 1) vector of endogenous variables, c is the intercept vector of the VAR, Ai is the ith matrix of autoregressive coefficients and εt is the generalization of a white noise process. The study estimated two sets of VAR models which incorporated the linear and nonlinear specifications of oil price response to economic activity. The first VAR model used the oil price variable measured as the log - first-difference of crude oil.

4.5 VAR Applications

A six-variable vector auto regression model is presented to examine the sources of variations and fluctuations in the Pakistan and south Asian countries economies triggered by oil prices. The first step of our analysis is to test for stationary – to investigate the existence of unit roots in our statistical series by calculating the Augmented Dickey-Fuller Test (ADF Test). This test is based on autoregressive models that always include an intercept and generally a trend component. A large negative test statistic rejects the null hypothesis and implies that the time series is stationary.

The Akaike information criterion (AIC) will be used to compare the performance of the VAR with various lag length specifications. Both variance decomposition and impulse responses will be utilized to assess the relationship between oil price shocks and aggregate economic activity. A variance decomposition provide the variance of forecast errors in a given variable to its own shocks and those of the other variables in the VAR. It allows us to assess the relative importance of oil price shocks to the volatility of the other variables. Impulse response functions allow us to examine the dynamic effects of oil price shocks on Pakistan and the British macroeconomics. It traces over time the expected responses of current and future values of each of the variables to a shock in one of the VAR equations.

5. Results and Discussion

In this section, the preliminary tests and data transformations are presented. Moreover, the empirical results obtained from the estimated VAR models using linear oil price specifications are discussed. The impulse response functions and variance decompositions obtained from the estimated VAR models are also expounded.

5.1 Presentation of Results

Tests of Stationary Econometric analysis using time-series data necessitates stationary. To have stationary representations of the VAR models, each variable was tested for unit roots specification using the augmented Dickey-Fuller (ADF) test. Table 1 and 2 provide the unit root regression results in levels and first-differences of the variables entered in the model and the corresponding critical value of 10%, 5% or 1% to reject the null hypothesis of the presence of a unit root.

Integration Test for Pakistan

The ADF statistics in Table 1 suggest that all six variables are integrated of order one, whereas the first-differenced are integrated of order zero. These non-stationary variables were transformed by taking their first differences in order to exhibit stationary, indicating that the mean, variance and covariance of the time series are independent of time.

Notes: We denote with one/two/three asterisks the rejection of the null hypothesis of the presence of unit root at 10% / 5% / 1% critical levels. The calculated statistics are those computed in MacKinnon (1991).

Integration Test

Table 2 provides the unit root regression results for the W. Only TBILLS was stationary in levels. The remaining variables, namely REER, RGDP, ROIL, GBONDS and M1 are observed to be non-stationary at all significance levels but exhibit stationary after the variables were transformed by taking their first difference, indicating that the mean, variance and covariance of the time series are independent time 16

Optimal Lag Length

Next, the Akaike Information Criterion (AIC) was used to assess the performance of the VAR model with varying lag length specifications. The optimal lag length is the one that minimizes the AIC. The AIC showed that the optimal lag length is six (6) for VAR models of Pakistan and the (refer to Table 3 and Table 4)

Impulse Response Function

An impulse response function (IRF) was computed from the coefficients of vector regression using orthogonalzed set of residuals. IRF traces the effect of one standard deviation shock to one of the innovations on current and future values of each of the endogenous variables in the system.

IRF: Pakistan

Generally, most of the variables show an increase during the first few quarters, with the exception of real GDP, GBONDS and ROIL. Chart 1 presents the IRFs generated from the VAR model using the linear specification of crude oil prices and show that a positive oil price shock leads to a decline in real GDP, long term interest rate and real oil price, persisting for three (3) quarters after which, the three variables recover. Money supply and short term interest rate increase a quarter (with the exception of real exchange rate which increases for three consecutive periods) after an oil price shock. However, such increase do not last long (i.e., M1 and TBILLS3 go back to its pre-shock level between the third and fourth quarters) while REER goes back to pre-shock level between four and fifth quarter.

VCOM: Pakistan

Table 5 shows the variance decomposition of the VAR model specification for Pakistan. It suggests that oil price shocks contribute a relatively large share on the long-term interest rate and reel effective exchange rate. In most cases, if not at all times, the variable itself are the largest source of its own variation in succeeding periods.

The largest effect of an oil shock to a variable's variation is on long-term interest rate (GBONDS5), accounting for approximately 18 percent in the third, fourth and the fifth period. Likewise, crude oil prices account for 11 percent of real exchange rate volatility.

Meanwhile, crude oil prices are marginal sources of variation of short-term interest rate (TBILLS3). Volatility of money supply (M1) due to oil price fluctuations is accounted for 8 percent. Changes in real GDP and TBILLS3 are nominal, accounting for only 5 percent and 4 percent respectively.

The largest effect of an oil shock to a variable's variation is on money supply, accounting for about 28 percent. Variation in M1 occurs in the third period due to innovation in ROIL but converge to about 26 percent after seven years. Meanwhile, the ROIL innovation has dominant effect on TBILLS3 and REER, accounting for 19 percent variation and 10 percent in the fifth period respectively. Crude oil prices are marginal sources of variation of RGDP and GBONDS5. Volatility of RGDP and GBONDS5 due to oil price fluctuations is accounted for 7 percent and 6 percent respectively.

6. Conclusion

The study estimated the relationship between crude oil price movements and key macroeconomic variables in the Pakistan and the W economies using linear vector auto regression model. Impulse Response functions and variance decomposition are obtained for both countries to assess how oil price shocks move through major channels of the Pakistan and W economies and how much shocks contribute to the variability of the variables in the system. Five macroeconomics variables were taken into consideration: Real Effective Exchange Rate (REER), Real Gross Domestic Product (RGDP), Short Term Interest rate (TBILLS3), long term interest rate (GBONDS5) and money supply (M1), together with world crude oil prices. The accumulated impulse responses obtained from the linear oil price specification indicate that oil price movements lead to decline in real GDP, long term interest rate for both countries. However, only marginal impacts are seen in short-term interest rate, money supply and REER for Pakistan. The variance decomposition estimated from the VAR model of the W shows that oil price fluctuations significantly contribute to the variability of money supply, short-term interest rate and REER. In the case of Pakistan oil price movements played are greater role in variability of long-term interest rate and REER. However crude oil prices are only marginal sources of the variation of RGDP for both Pakistan and the W.

References

Abeysinghe, T. (2001). Estimation of direct and indirect impact of oil price on growth. *Economics Letters,* 73(2), 147-153.

Atkeson, A., & Kehoe, P. J. (1999). Models of Energy Use: Putty-Putty versus Putty-Clay. *American Economic Review,* 89(4), 1043

Backus, D. K., & Crucini, M. J. (2000). Oil prices and the terms of trade. *Journal of International Economics,* 50(1), 213

Barsky, R. B., & Kilian, L. (2001). Do We Really Know that Oil Caused the Great Stagflation? A Monetary Alternative. NBER/Macroeconomics Annual, 16(1), 137-183.

Bernanke, B. S., Gertler, M., & Watson, M. (1997). Systematic Monetary Policy and the Effects of Oil Price Shocks. Brookings Papers on Economic Activity(1), 157.

Berndt, E. R., & Wood, D. O. (1979). Engineering and Econometric Interpretations of Energy-Capital Complementarily. *American Economic Review,* 69(3), 354.

Bryan, M. F. (2002). Is It More Expensive, or Does It Just Cost More Money? *Economic Commentary.*

Burbidge, J., & Harrison, A. (1984). Testing For the Effects of Oil--Price Rises Using Vector Auto regressions. *International Economic Review,* 25(2).

Chang, E. C., & Cheng, J. W. (2000). Further evidence on the variability of inflation and relative price variability. *Economics Letters,* 66(1), 71-77.

Chang, Y., & Wong, J. F. (2003). Oil price fluctuations and Singapore economy. *Energy Policy,* 31(11), 1151-1165.

Cooper, J. C. B. (2003). Price elasticity of demand for crude oil: estimates for 23 countries. *OPEC Review: Energy Economics & Related Issues,* 27(1), 8.

Crook, C. (2006). Shock Absorption. Atlantic Monthly (1072-7825), 297(5), 32-32.

Cunado, J., & Perez de Gracia, F. (2005). Oil prices, economic activity and inflation: evidence for some Asian countries. *The Quarterly Review of Economics and Finance,* 45(1), 65-83.

Darby, M. R. (1982). The Price of Oil and World Inflation and Recession. 28American Economic Review, 72(4).

Davis, S. J., & Haltiwanger, J. (2001). Sectoral job creation and destruction responses to oil price changes. *Journal of Monetary Economics,* 48(3), 465-512.

Davis, S. J., Prakash, L., & Ramamohan, M. (1996). Regional Labor Fluctuations: Oil Shocks, Military Spending, and Other Driving Forces: University of Chicago.

de Miguel, C., & Manzano, B. (2006). Optimal oil taxation in a small open economy. *Review of Economic Dynamics,* 9(3), 438-454.

Doroodian, K., & Boyd, R. (2003). The linkage between oil price shocks and economic growth with inflation in the presence of technological advances: a CGE model. *Energy Policy,* 31(10), 989-1006.

Fisher, E. O. N., & Marshall, K. G. (2006). The Anatomy of an Oil Price Shock: Federal Reserve Bank of Cleveland.

Fisher, E. O. N., & May, S. L. (2006). Relativity In Trade Theory: Towards A Solution to the Mystery Of Missing Trade. Retrieved June 3, 2007, from http://www.cesifo.de/pls/guestci/download/CESifo%20Working%20Papers%202006/CESifo%20Working%20Papers%20October%202006/cesifo1_wp1818.pdf

Guidi, M. G. D., Russell, A., & Tarbert, H. (2006). The effect of OPEC policy decisions on oil and stock prices. OPEC Review: *Energy Economics & Related Issues,* 30(1), 1-18.

Hamilton, J. D. (1983). Oil and the Macroeconomy since World War II. *Journal of Political Economy,* 91(2), 248.

Hamilton, J. D. (1996). This is what happened to the oil price-macroeconomy relationship. *Journal of Monetary Economics,* 38(2), 220.

Hanson, K., Robinson, S., & Schluter, G. (1993). Sectoral Effects of a World Oil Price Shock: Economywide Linkages to the Agricultural Sector. *Journal of Agricultural and Resource Economics,* 18(1), 96-116.

Herrera, A. M. (2006). Oil Price Shocks and Macroeconomic Dynamics: The Role of Inventories. Retrieved June 4, 2007, from http://www.msu.edu/~herrer20/documents/HFebruary2006.pdf

Hondroyiannis, G., & Papapetrou, E. (1998). Temporal causality and the inflation-productivity relationship: Evidence from eight low inflation OECDcountries.International *Review of Economics & Finance,* 7(1), 29117-135.

Hooker, M. A. (1996). This is what happened to the oil price-macroeconomy relationship: Reply. *Journal of Monetary Economics,* 38(2), 222.

Hooker, M. A. (1996). What happened to the oil price-macroeconomy relationship? *Journal of Monetary Economics,* 38(2), 213.

Hooker, M. A. (2002). Are Oil Shocks Inflationary? Asymmetric and Nonlinear Specifications versus Changes in Regime. *Journal of Money, Credit & Banking,* 34(2), 540-561.

Hui, G., & Kliesen, K. L. (2005). *Oil Price Volatility and U.S. Macroeconomic Activity. Review* (00149187), 87(6), 669-683.

Hunt, B. (2006). Oil Price Shocks and the U.S. Stagflation of the 1970s: Some Insights from GEM. *Energy Journal,* 27(4), 61-80.

International Energy Agency. (2004). Analysis of the Impact of High Oil Prices on the Global Economy.

Jiménez-Rodríguez, R., & Sánchez, M. (2004). Oil price shocks and real GDP growth: empirical evidence for some OECD countries. European Central Bank Working Paper Series(362)

Keane, M. P., & Prasad, E. S. (1996). The Employment and Wage Effects of Oil Price Changes: A Sectoral Analysis. *Review of Economics & Statistics,* 78(3), 389-400.

Kim, I.-M., & Loungani, P. (1992). The role of energy in real business cycle models. *Journal of Monetary Economics,* 29(2), 189.

Kpodar, K. (2006). Distributional Effects of Oil Price Changes on Household Expenditures: Evidence from Mali: International Monetary Fund.

Lee, K., & Ni, S. (1995). Oil shocks and the macroeconomy: The role of price variability. *Energy Journal,* 16(4).

Lee, K., & Ni, S. (2002). On the dynamic effects of oil price shocks: a study using industry level data. *Journal of Monetary Economics,* 49(4), 823-852.

Long, J. B., & Plosser, C. I. (1983). Real Business Cycles. *Journal of Political Economy,* 91(1), 69.

Lucas Jr, R. E. (1980). Methods and Problems in Business Cycle Theory. 30 *Journal of Money, Credit & Banking,* 12(4), 696-715.

Masih, R., & Masih, A. M. M. (1996). Macroeconomic activity dynamics and Granger causality: New evidence from a small developing economy based on a vector error-correction modelling analysis. *Economic Modelling,* 13(3), 407-426.

Mehrara, M., & Oskoui, K. N. (2007). The sources of macroeconomic fluctuations in oil exporting countries: A comparative study. *Economic Modelling,* 24(3), 365-379.

Mork, K. A. (1989). Oil and the Macroeconomy When Prices Go Up and Down: An Extension of Hamilton's Results. *Journal of Political Economy*, 97(3).

Perron, P. (1989). The Great Crash, The Oil Price Shock, and the Unit Root Hypothesis. *Econometrica* 57(6).

Peter Ferderer, J. (1996). Oil price volatility and the macroeconomy. *Journal of Macroeconomics,* 18(1), 1-26.

Polgreen, L., & Silos, P. (2006). Crude Substitution: The Cyclical Dynamics of Oil Prices and the College Premium. Working Paper Series (Federal Reserve Bank of Atlanta)(14), 1-34.

Raguindin, M. C. E., & Reyes, R. G. (2005). The Effects of Oil Price Shocks on the Philippine Economy: A VAR Approach. University of the Philippines

Rotemberg, J. J., & Woodford, M. (1996). Imperfect Competition and the Effects of Energy Price Increases on Economic Activity. Journal of Money, Credit & Banking, 28(4), 577.

Siegel, G. E. (2007). Fed's Poole: Oil Price Shocks Need Not Lead to Recession. *Bond Buyer,* 359(32579), 2-2.

Sims, C. A. (1980). Macroeconomics and Reality. *Econometrica* (pre-1986), 48(1), 1.

Strongin, S. (1995). The identification of monetary policy disturbances explaining the liquidity puzzle. *Journal of Monetary Economics,* 35(3), 497.

Trehan, B. (2005). Oil Price Shocks and Inflation. *FRBSF Economic Letter,* 2005(28), 1-3.

Valadkhani, A., & Mitchell, W. F. (2002). Assessing the Impact of Changes in Petroleum Prices on Inflation and Household Expenditures in Australia. *Australian Economic Review,* 35(2).

Table 1. Unit Root tests for Pakistan

	Level		First Difference	
REER(log)	3	-3.189	1	-6.567***
RGDP(log)	8	-2.778	4	-4.7687**
ROIL(log)	5	-1.877	5	-5.899***
BOND5	1	-2.67	6	-5.878**
TBILLS3	4	-3.56	4	-4.787**
MI	6	-3.776	3	-4.56**

Table 2. Unit Root tests for Consumers preferences in Purchase decision

	Level		First Difference	
REER(log)	1	-3.189	1	-6.567***
RGDP(log)	3	-2.778	4	-4.7687**
ROIL(log)	4	-1.877	5	-5.899***
BOND5	3	-2.67	6	-5.878**
TBILLS3	4	-3.56	4	-4.787**
MI	4	-3.776	3	-4.56**

Notes: We denote with one/two/three asterisks the rejection of the null hypothesis of the presence of unit root at a 10% / 5% / 1% critical levels. The calculated statistics are those computed in MacKinnon (1991).

Table 3. Identifying the Optimal Lag Length using the Akaike Information Criterion (AIC) for Pakistan

VAR order p (VAR(p))	AIC Using Linear Oil Price Specification
1	58.90
2	60
3	66
4	84
5	83
6	66

* optimal lag length

Table 4. Variance Decomposition of Pakistan

Variance Decomposition of DGBONDS5

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.67678	0.655444	0.776756	0.000000	0.7655444	0.7654	0.776656
2	0.35 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.751273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.876996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	.495348						
6	0.313694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	.621995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.835914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.70875	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of DLOGREER:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of DLOGRGDP:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.8765	0.7666656	0.98765	0.9876	0.4566	0.34565	0.87655
2	0.32211	0.7766	0.89765	0.7654	0.9765	0.8754	0.8765
3	0.76654	0.666678	0.886767	0.78767	0.75444	0.765544	0.67665
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.876686	0.86767	0.7867658	0.765544	0.87655	0.787756	0.76565
6	0.86756	0.7866656	0.7665464	0.86654	0.876544	0.86767	0.8867576
7	0.721995	35.41632	0.76756	0.7867565	0.8868767	0.65433	0.6765644
8	0.735914	0.678788	0.7654454	0.7767657	0.867676	0.777575	0.767677
9	0.6778768	0.7867656	0.655442	0.7655544	0.5644332	0.765544	0.9876654
10	0.7655433	0.9786778	0.7766556	0.8765554	0.7877656	0.877676	0.88676765

Variance Decomposition of DLOGROIL:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.43345	0.676766	0.787878	0.89786	0.676656	0.455676	0.76767
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	.595348	0.7868768	0.676868	0.776756	0.786767	0.786876	0.886767
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.21995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of DM1:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.89787	0.78797	0.786775	0.897868	0.897868	0.786755	0.786755
2	0.7867765	0.787675	0.786755	0.78786	0.798786	0.798789	0.7878
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.7876765	0.6768678	0.677687	0.78676	0.785554	0.768676	0.687665
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of DTBILLS3:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Table 5. Variance Decomposition of the W

Variance Decomposition of DGBONDS5:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.78788	0.9899	0.565767	0.68787	0.7879	0.56565	0.87878
2	0.67687	0.676889	0.78686	0.67676	0.676565	0.878666	0.56578
3	0.78787	0.57686	0.68787	0.8798977	0.687879	0.68798	0.688686
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348	5.7879	0.7879	0.78898	0.6779	0.897768	0.79898
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of DLOGREER:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of DLOGRGDP:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of DLOGROIL:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of DM1:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011

Variance Decomposition of TBILLS3:

Period	S.E	DGBONDS5	DLOGREER	DLOGRGDP	DLOGROIL	DM1	DTBILLS3
1	0.387060	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.45 2598	73.36755	8.405591	.392457	10.32563	7.305384	0.203387
3	0.551273	55.68356	14.23091	1.389421	18.35258	8.936622	1.406901
4	0.576996	49.68548	15.86917	1.780212	17.08974	11.14166	4.433740
5	0.595348						
6	0.613694	47.67375	15.84813	2.058740	16.08744	12.46156	5.870373
7	0.721995	35.41632	26.78769	9.434622	12.90560	10.33838	5.117391
8	0.735914	37.22048	25.96283	9.081654	12.47635	10.33249	4.926195
9	0.754609	35.44578	26.30599	10.29315	11.89478	10.67045	5.389840
10	0.760375	34.99902	25.92424	10.15663	11.71640	11.80470	5.399011